CAPE EXPEDITION—SCIENTIFIC RESULTS OF THE NEW ZEALAND
SUB-ANTARCTIC EXPEDITION, 1941-45

THE LIGHT-MANTLED SOOTY ALBATROSS AT CAMPBELL ISLAND

by

J. H. SORENSEN

ONWARD
NEW ZEALAND

Issued under the authority of the Hon. K. J. Holyoake
Minister of Scientific and Industrial Research

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Bulletin No. 8

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FOREWORD

THIS SERIES OF REPORTS is based in the main on collections of specimens and data made at the Auckland and Campbell Islands in the years 1941–45. Early in 1941, coast-watching stations were established at Port Ross, Carnley Harbour, and Perseverance Harbour, and the personnel of from three to five men at each were relieved only once a year. Standing instructions issued by Navy Office included a recommendation that the men should, in addition to service routine, record general observations on natural phenomena. In making a selection of suitable volunteers, the Aerodromes Branch of the Works Department was able from 1942 to post at each station at least one man with some professional qualifications in geology or biology. The names of most of them are given below in the list of committee members, but the collections were enriched by the work of many others who made no claim to professional status as naturalists.

In 1944, coast-watching was abandoned and the Auckland Islands stations closed, but in that year special opportunities were given for visits to the Snares and Disappointment Island. The Campbell Island station was continued for routine meteorological reporting and ionosphere research, but, except for the inclusion of a report on Aurorae as number one of this series, all results of this work are published elsewhere. Biological and geological material collected after 1945 has not generally been included, and these reports may be regarded as covering the work of the "Cape Expedition" which was the war-time code name for parties in the field between 1941 and 1945.

Arrangements for the writing of reports and for publication have been dealt with by a committee consisting of Dr. H. H. Allan (Chairman), Dr. J. Marwick, the Directors of Auckland, Dominion, Canterbury, and Otago Museums, and the following field collectors: C. A. Fleming, J. H. Sorensen, W. H. Dawbin, E. G. Turbott, and R. W. Balham. The Committee is indebted to authors who have undertaken to prepare reports, and to Mr. F. R. Callaghan, Secretary of the Department of Scientific and Industrial Research, and to his staff, for arrangements for publication.

R. A. FALLA,

Hon. Secretary, Cape Expedition
Reports Committee.

THE LIGHT-MANTLED SOOTY ALBATROSS

Phoebetria palpebrata Forster

AT CAMPBELL ISLAND

By J. H. SORENSEN

(*Manuscript received by Cape Expedition Reports Committee, September 6, 1948.*)

INTRODUCTION

THE RECORDING of the full life-history of the Sooty Albatross does not seem to have been undertaken by any previous writer, mainly because so few persons have had the opportunity to live on subantarctic islands for any length of time. The present paper is a summation of the knowledge gained by the author whilst studying this and other species on Campbell Island in 1942, 1943, 1945, part of 1946 and in 1947. He is fully aware that it is incomplete in some respects, but presents it as a contribution to the better knowledge of the life and habits of this beautiful bird.

Other writers have given some useful accounts of the species observed in various localities from time to time. In the main, the writer agrees with their findings. The new facts presented are given rather fully, particularly those relating to the growth of the chicks from hatching to first flight. Although verified by other observations at various parts of the island, the main details of this work are compiled from the study of mated pairs which nest each year on Beeman Hill, just to the east of the Public Works camp on the central part and near the head of Perseverance Harbour. These birds are all ringed.

Campbell Island has an area of 42 square miles and possesses a rugged and steep coastline. On the coastal cliffs and rocky islets, and, to a lesser degree, on cliff faces inland, Sooty Albatrosses nest each year. Any attempt at obtaining an approximately correct total of the number of birds nesting each year is almost impossible because of the distance to be travelled and the rugged nature of the country. The first "Cape" party on the island in 1941 stated that Sooty Albatrosses were not numerous and that perhaps only 80 to 100 pairs nested annually. This is a considerable underestimation and, based on counts taken at various parts when in the field, the writer submits that there cannot be less than a thousand mated pairs nesting annually.

All writers seem to agree on the beauty of the Sooty Albatross, whether it is seen on the wing or at closer quarters at its nesting site. Oliver[4] states: "This species is perhaps the most perfect sailer or glider of all sea birds, it seldom being seen to flap its wings."

Falla[1] remarks as follows: "In its careful choice of nesting site, graceful courtship, the mutual attachment of the pairs, and assiduous care of the young, this albatross compares more than favourably with the larger species of the Diomedeidae. Its behaviour under all circumstances suggests superior mental capacity, as its 'expression' suggests the intelligence of a well-bred horse."

The present writer heartily agrees with these statements and adds that, during the time mated pairs were intensively studied, he came to look forward to the weekly trip for weighing and measuring the chicks despite the most adverse climatic conditions. Although wary, and even sometimes resentful, at first, both adults and chicks ultimately accepted the peculiar attentions he gave them. After a few visits it was even found unnecessary to use a glove for protection against the powerful mandibles, so trusting had the "sooties" become. Even when crimping on leg-rings the birds gave little bother. One female became extraordinarily tame after a few visits and would look on whilst scales, notebook, dividers and other equipment were set out. Then, when spoken to, would rise, disclose the tiny chick, and allow it to be gently removed with an ungloved hand, settling back on the nest until the job was completed. At another word or two the bird would rise again to have the chick replaced. With a few gentle shuffles to settle the chick to her and its satisfaction she settled down again, being apparently completely satisfied that no harm would come from the intruder into her domestic circle. It was found that most Sooty Albatrosses were very tolerant in this respect and the casual acceptance of human company was not rare. Quite frequently the writer has sat on a ledge used by the birds and had them almost pause to survey him in their to and fro flight and finally to settle within three feet and carry on with their normal occupations.

Although Sooty Albatrosses seem so friendly and trusting, it is necessary to exercise caution in the early part of the breeding season. Some birds are easily alarmed at this time and, if one attempts to handle them for ringing purposes, will make a great outcry and even entirely desert nest and egg. Even probable nesting sites are sometimes deserted if one interferes by removing vegetation for better photographic purposes. In 1943 a ringed pair deserted a well-formed nest for this reason, most unfortunately before the numbers were ascertained.

MEASUREMENTS AND DETAILS OF SPECIMENS

Spec. No.	Sex	Weight lb.	Length cm.	W. span cm.	Wing cm.	Tail cm.	Tarsus cm.	Toe cm.	Beak cm.
A.C.43.239	Male	6½	89.0	224.0	58.0	32.0	8.0	13.5	10.7
A.C.43.240	Fem.	6	87.5	212.0	52.5	28.0	7.5	12.5	10.0
A.C.43. 69	Male	5½	88.5	216.0	57.0	31.0	8.0	12.7	10.1
A.C.43.161	Fem.	6½	85.5	210.0	53.2	18.8	7.8	12.8	10.0
A.C.43.162	Fem.	7½	81.5	210.4	50.5	17.0	7.6	12.3	9.9

Note.—A.C.43.239 and 240 are a mated pair. A.C.43.161 and 162 are juveniles taken from the nest just before flight.)

		Weight lb.	Length cm.	W. span cm.	Wing cm.	Tail cm.	Tarsus cm.	Toe cm.	Beak cm.
Adult averages:		6	88.3	217.3	55.8	30.3	7.8	12.9	10.2
Juvenile averages:		7	83.5	210.2	51.8	17.9	7.7	12.5	9.9
Averages South Georgia region (Murphy):		—	—	—	51.7	26.9	8.2	12.2	11.0
Averages N.Z. region (Murphy):		—	—	—	52.5	27.3	8.1	12.1	10.5
Averages Indian Ocean (Murphy):		—	—	—	52.8	26.2	8.0	12.1	10.3
Averages, various sources (Falla):		—	—	—	53.5	26.5	8.0	12.2	10.5
Average bird (Oliver):		—	82.0	—	48.0	24.0	7.0	—	10.6

The few birds taken as specimens are not sufficient to give a good series of average measurements. It will be noted, however, that there is a difference in all the measurements of males as compared with those of females. This is most marked in the case of the mated pair and reveals a sexual discrepancy already noted by Murphy.

For comparison the gross averages from the tables published by Falla, Murphy and Oliver are given. The following descriptions of the specimen birds taken on Campbell Island are now given:

A.C.43.239 and 240: 1/11/43. A mated pair. Colours (both)—eye dark greyish brown; beak black with mandibular sulcus pale blue (bluish-white); feet light bluish-grey, darker towards extremities of webs, lighter on tarsi. Parasites—a few feather lice. Stomach—239 empty except for a few squid beaks; 240 empty.

A.C.43.69: 27/10/42. Eye dark greyish-brown; bill black with the mandibular sulcus pale blue; feet fleshy blue-grey, claws ivory-white. Parasites—a few lice. Stomach—a small quantity of fish flesh.

A.C.43.161: 21/5/43. Eye dark golden-brown; beak black with mandibular sulcus just turning bluish-brown at the base; feet brownish and suffused with blue on the webs. Parasites—a few lice. Stomach—empty.

A.C.43.162: 21/5/43. Colours of soft parts as preceding juvenile except mandibular sulcus, which is brownish. Parasites—a few lice. Stomach—contained two pellets almost ready for ejection. Both were composed of feathers and amongst which were a few eye lenses and squid beaks. Neither contained any bones. The larger of the two measured 5 inches in length by 1½ inches in diameter.

ANNUAL ARRIVAL AND COURTSHIP

The Sooty Albatrosses are absent from the island all winter and do not reappear until late spring. A close watch was kept in all years for the first arrivals, and it was found that the birds were first seen about the outer cliffs of the island and some days later about the inland nesting sites. This arrival, which varies annually by only a few days, is definitely influenced by climatic conditions. Sooty Albatrosses are not seen when the weather is rough or boisterous and, like the Royal Albatrosses, prefer wind forces of five or under on the Beaufort scale. They even prefer less wind than do the Royal Albatrosses, a fact which is no doubt influenced by the type of flight used and the country on which they nest.

The first birds in 1942 were seen in early October, one being seen inland near Beeman Hill on the 8th and three on the coast near Mount Yvon Villarceau the day before. In 1943 the birds were noted about the coastal cliffs on 4th October, but not seen about Beeman Hill until the 8th. In 1945 they were seen in numbers at sea just off the island and around the coastal cliffs on 9th October. In this year they first appeared about Beeman Hill on the 12th. On 4th October of 1947 Sooty Albatrosses were first observed about Beeman Hill.

The above dates agree reasonably closely with one given by Murphy: "The first appearance of Sooty Albatrosses in the neighbourhood of their nesting sites on the cliffs was noted by members of the German International Polar Expedition at Royal Bay (South Georgia) on October 16th."

In the same section Murphy also states: "The method of selecting territory, and the preliminary stages of mating are unknown. Possibly courtship is begun at sea, or in the bays, for the birds appear to be mated when they occupy the ledges of cliffs . . ."

Although rather fragmentary, the writer's records of ringed birds (and all birds intensively studied were ringed) indicate that they are already mated on arrival. Indeed, present indications would seem to show that the Sooty Albatrosses, like the Royal Albatrosses, mate for life.

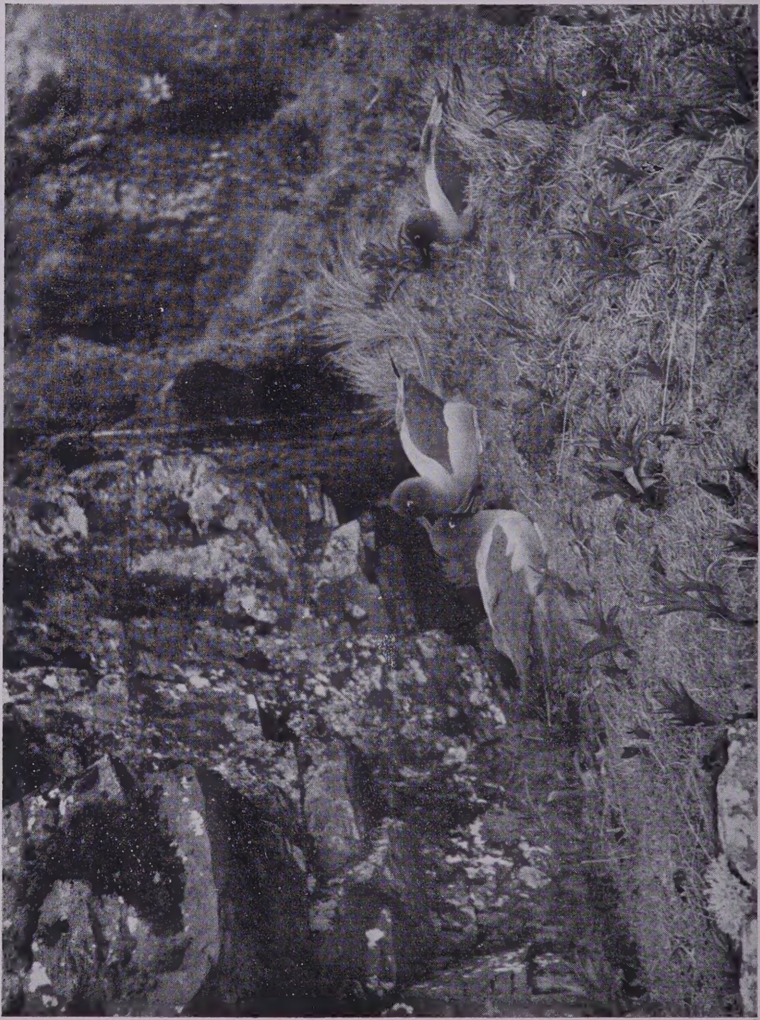

Fig. 1—Mated pair of Sooty Albatrosses resting on a ledge with a third and unmated bird nearby.

In many cases of "courtship" between already mated pairs there is a third bird (Fig. 1) present in the capacity of a spectator, this latter bird being judged to be a juvenile unmated one. Such unmated birds probably select partners late in the year and nest the following season, for the courtship actions have been observed at a very late date, even after most mated pairs have hatched their chicks. In such cases of late courtship there is no sign of nest or nest construction. A journal entry for 28th December reads, "Many Sooty Albatrosses are still seen at various parts of the island conducting courtship activities. As they will not now breed this season, one can only conclude that such birds are juveniles approaching maturity and will breed next season." That the breeding age is reached fairly rapidly is evidenced by the finding of the bird ringed 19A, ringed as a fledgling on Lyall Ridge on 3rd May, 1945, mated and breeding on Beeman Hill on 19th January in 1947.

The Sooty Albatrosses seem to spend the first few days after arrival at the breeding sites in flying to and fro or circling around. Only after several days have passed are the characteristic calls of birds on the ground heard. Falla has described the call of the birds thus: "Both the older birds were uttering at intervals the double call that is usually associated with mating, a shrill 'pee' with the bill pointed skyward and a final 'arr' with the bill pressed in against the foreneck." Although it is hard to put down bird sounds in human language, this description is remarkably adequate, and Murphy records that sailors' names at various islands in the South American region are Pio, Piew, Pee-arr, and Peole. Murphy also records that the call has been variously described as a screech, as resembling the *meow* of a cat, or the cry of an ass. Matthews[2] describes the note: "It consists of two notes, first a loud shrill one made with the beak open and the head thrown back, so that the bird is looking straight up into the sky. This is an expiratory note and is immediately followed by a much lower and quieter inspiratory note, made with the bill closed and held pointing down to the ground so that the under surface of the mandible rests against the breast."

The repeated calling of the birds is a feature of the early days of courtship and nesting. It is heard less and less as the season advances. The present writer would prefer to describe it as a crowing note and to state that he fails to find any resemblance to equine or feline calls and still less to a screeching one.

A feature of the days of courtship is the "dual" flying of the mated pairs, a flight which has compelled the admiration of all fortunate enough to witness it. Again Falla is quoted: "In the spring of 1929 they were not uncommon at sea, but near the Crozets, Kerguelen and Heard Island, where they were breeding, were seen flying in pairs with graceful and spectacular simultaneous evolutions which must have been part of the courtship routine. Each pair would skim the surface with wings almost touching each other, then bank up with a sweeping arc without losing their relative positions." Falla's observations were taken at sea, but describe accurately the peculiar flight of mated pairs. Over land it is none the less spectacular and, as the birds dip their wing-tips, first to one side and then to the other, in perfect unison, it makes a memorable sight. The occasional presence of a third bird, which does not follow the synchronisation of flight of the mated pair, only heightens the effect of the "dual" flight.

The flight of the birds and their callings are not the only courtship activities in which they indulge. On the ground, close to the site where the nest is to be constructed, there is a rather elaborate ceremony which gives evidence of the attachment between mated birds. Quoting Hamilton's field notes on Macquarie Island in 1911–13, Falla states: "A courtship dance was watched on November 4th, 1912, when a pair of sooties had selected a nesting site. I was able to approach within a few feet of the birds and watch closely the evolutions. The female was sitting on the ledge when the male approached and gently touched the female with his beak, making at the same time a noise resembling the noise of vomiting. Both birds then stood up, put their heads together, and both made guttural sounds.

Then a walk round in a circle completed the evolution. Further observations had to be postponed, as the birds were then photographed and caught by hand for specimens."

Hamilton saw only a small part of this phase of the courtship activities. The following description was written by a member of the first party on Campbell Island in 1941. It agrees so well with what the present writer has seen that it is quoted in full: "Sooty Albatross courting is done partly on the ground and partly in the air. On the ground both birds stand facing each other; turns are taken in giving a cry in the same manner as the Royal Albatross, but in a different key. This call is repeated two or three times, then both birds arch the neck and pull the head in close to the breast. The head is then turned quickly from side to side so that the white feathers which surround the eyes and the blue stripe on the bill appear to flash. At the same time the tail feathers are spread and lifted somewhat like the peacock, but at an angle of about 45 degrees; this is to show the white ribs of the feathers. The birds then slowly gyrate round one another perhaps a quarter or half turn with the tail feathers still spread and the neck arched, at the same time making a soft cooing sound. This performance is repeated at intervals of half a minute duration and about six or eight times; between whiles both birds sit or stand together and make apparently vicious snaps at each other. After several repetitions of these manoeuvres one bird moves to the edge of the cliff ledge, then, facing the other bird, it opens its beak, thrusts its head forward and swings it back in a typically inviting movement; in fact, the motion of the head is so expressive that one almost expects to hear the bird say, 'Come on, let's fly off.' This motion is repeated until the other bird approaches, then they both fly off and commence flying backwards and forwards along the cliff face. The flying goes on for perhaps ten minutes to a quarter of an hour. Then back to the ledge for the ground performance."

The above description fits fairly well what the writer saw of the early days of Sooty Albatross courtship. Towards the end of October the birds commence the construction of a nest and the female does most of this work. There is still a fair amount of ground display and this includes much "beak-thrusting." In this action one bird opens its beak and thrusts it rapidly at the other, just as rapidly withdrawing it. The other bird does the same, and each may thrust at the other from fifteen to twenty times. This thrusting is not an aggressive action, but seems to be for the purpose of displaying the bright pinkish coloration of the interior of the beak and gape and to afford emotional stimulus. A somewhat similar procedure has been recorded among the northern Fulmar Petrels. Wells, Huxley and Wells[5] state: "Fulmar Petrels have no bright colours of plumage; but for their display they use 'interior decoration' in the shape of the delicate mauve lining of their mouths; two Fulmar Petrels languishingly waving their open mouths at each other is a sight not to be forgotten."

Copulation takes place after intense bouts of the various courtship proceedings. One pair watched on 1st November, 1943, were so intent on their courtship that they entirely ignored human approach to within six feet. The nest was at least half built and the female sat in this, the male standing alongside. Very little beak-thrusting was taking place, but both birds did much nibbling of one another's head and both occasionally called lustily. (Fig. 2.) Then the male appeared to grow very excited and finally scrambled on top of the female's back whilst she partly spread her wings. Then lowering his tail and using a screwing motion to brush aside the female's tail feathers copulation was achieved. The pair were then collected, and from the oviduct of the female (A.C.43.240) a fully developed egg was obtained.

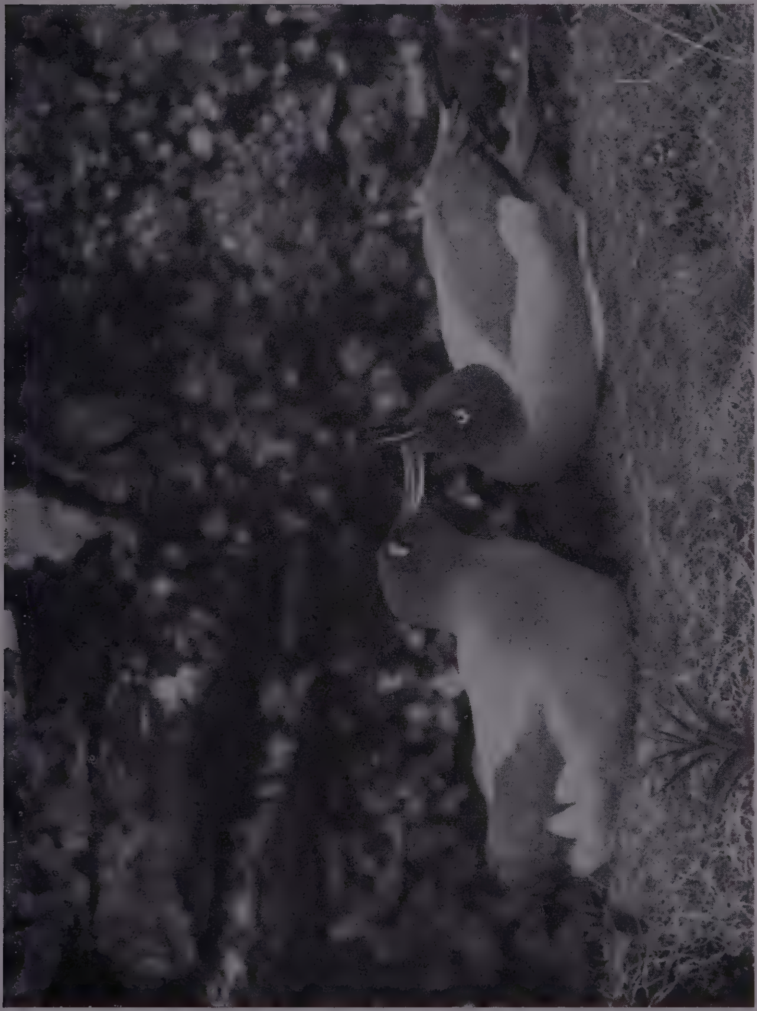

Fig. 2—Mutual preening—part of the courtship proceedings.

NESTS AND EGGS

The nest is at least partly constructed during the latter part of the courtship. Like the Royal Albatrosses, the Sooty Albatrosses put in a good deal more work once incubation commences and are continually plucking at any nearby herbage whilst on the nest. Some soil or mud, too, is plastered on with the sides of the mandibles used trowel-fashion. Observations among Sooty Albatrosses show that all nest building is undertaken by the female.

One bird watched nest-building on 18th October, 1942, was on a narrow ledge and shuffled off a foot or so when approached, but returned promptly when the investigator retired a few feet. The nest was in an early stage of construction and the material used was the fibrous peat and moss which formed the base of an overturned tussock. The bird sat in the middle of a shredded pile and with the beak built the material round her, keeping the hollow just right by shuffling and twisting the body. On the same day other birds were watched in a different locality. Here another material had to be used, for the soil was more earthy, but the same manner was adopted. Two nests, about twenty feet apart, were on a steep slope, a site quite different from the ledges usually chosen by this species. The top bird of the two had only a slight hollow formed and called almost incessantly. The lower bird was farther ahead, worked more and called less. In both cases mud from the moist earth was being packed round the sitting bird, which sat very closely when approached, and had to be raised to see if an egg was present at this early date. There were no eggs and as soon as the intruder retired the birds continued their work.

All nest-building birds have much dirt adhering to the plumage, particularly on the ends of the secondaries of the wings, and received through the pressing rotatory movements of the body when forming the crater of the nest. The breasts, too, become very caked with dirt. In the earlier days of Royal Albatross courtship it is the male which is most often seen constructing the nest.

At this stage it is as well to mention the statements published by other writers concerning the choice of sites each season. Falla, quoting Hamilton's field notes for Macquarie Island, says: "It seems probable that the same birds return to certain breeding spots each year. Several birds nest together, in one case at least, although generally the nests are solitary."

Murphy states: "While the pairs of Sooty Albatrosses have no gregarious interest in others of their kind during the breeding season, neither do they exhibit any territorial jealousy against the close proximity of another nest. I found nests on ledges only a few meters apart and the same phenomenon has been reported by others."

In a quotation from Sharpe (1879), Murphy writes: "The nests appear to be used many years in succession, as the original materials of several that were examined seemed to have been reduced by age to vegetable mould. These old fabrics are relined with fresh dry grass when the birds return at the commencement of the breeding season."

Of all the mated pairs observed by the writer on Campbell Island, not one pair has ever occupied the nest used the previous season. Indeed, the mated pairs on Beeman Hill have always constructed a new nest each season. Occasionally the nest has been built within eighteen inches of an old one. Observations lead to the conclusion that Sooty Albatrosses, like the Royal Albatrosses, usually return to the same locality, but almost invariably construct a fresh nest. In many cases on Beeman Hill the new season's birds have chosen a site on the opposite side of the hill to that used when they last nested. From the number of old nests found untenanted each year, and from the number of new nests known to be constructed, it seems quite safe to state that on Campbell Island the old nest is not used again by the same birds for at least many years. By this time normal erosive agencies and decay will have reduced it almost level with the surrounding country.

Although in agreement with the statement by Murphy that Sooty Albatrosses do not exhibit any territorial jealousy against the close proximity of another nest, what appears to be definite gregarious interest has been noted on several occasions on Campbell Island. Beeman Hill offers a wide variety of nesting sites and has never been known in the writer's experience to have more than three mated pairs nesting in any one year. On at least three occasions the same two mated pairs have nested within four feet of one another, despite seemingly excellent sites elsewhere, and on an entirely different part of the hill. In one case the second nest had to be built among tall tussock and gave the birds a little trouble in landing and taking off again. In 1947 three pairs, one of them the mated pair which had previously shown gregariousness, nested on Beeman Hill within one chain of a site used before. The three nests formed a triangle with four foot sides. (Fig. 3.)

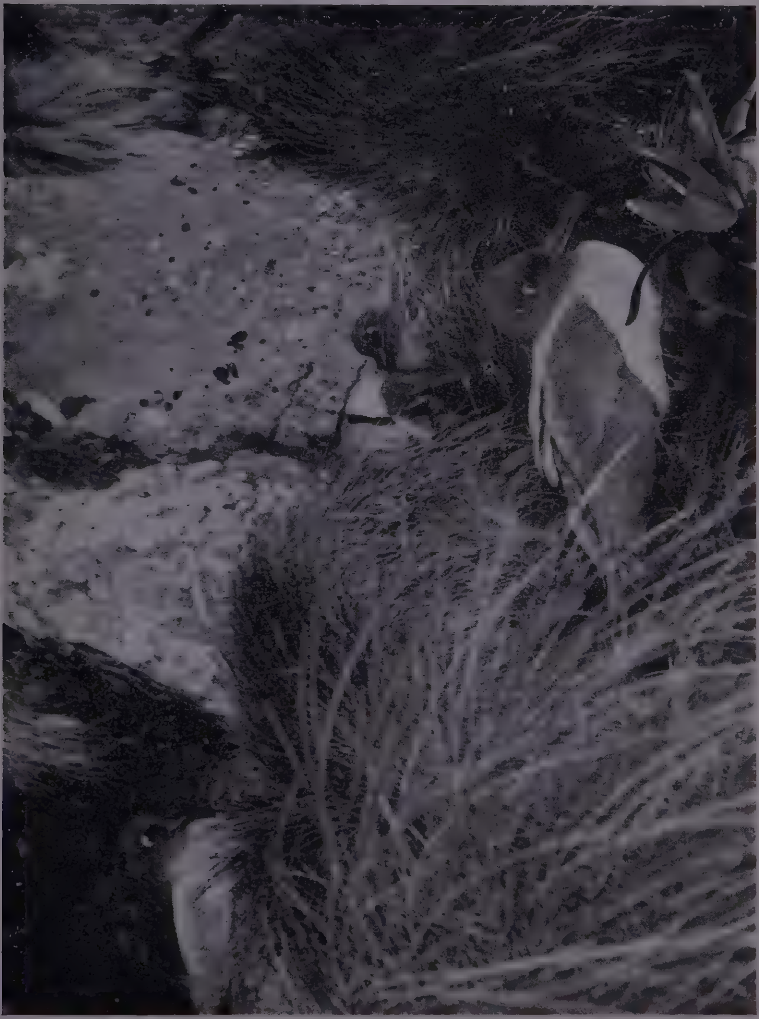

Fig. 3—Gregarious interest. (See text.)

Many nests are solitary on the island and, on the other hand, certain favoured ledges have been known to contain four to five nests spaced about four feet apart. The sites most often used are eroded ledges from which the birds can take off by propelling themselves outward. No run is taken, as is usually the case with Royal Albatrosses. The "Sooties" are indifferent walkers, like their relatives the mollymawks, which also simply leap out and soar away on the up-draught which almost invariably exists about their somewhat similar nesting territory. Sooty Albatross nests are situated from nearly at sea-level to high on steep cliffs and inland hills. In the latter places some birds even utilise the eroded caverns and holes among huge boulders. Any site will suit the birds so long as it has steeply falling ground below to give them room for the take-off. This is achieved by means of a low swoop and a few rapid wing-beats, the initial impetus coming from the legs. In fern, tussock or level ground they find it impossible to take off. This fact was brought home to the writer when a bird fell off a ledge when startled and, being unable to turn and so take flight, fell into a patch of fern some thirty feet below. It struggled vainly for some time, but finally managed to gain a rocky eminence and attained flight from this position.

EGGS AND INCUBATION

The clutch is one and the eggs are an elliptic oblong, one end being slightly broader than the other. The colour is white with a zone of reddish-brown spots on the larger end. Description and measurements are as follows:

Spec. No.	Date	Weight	Measurements	Condition
A.C.43.71	31/10/42	7¾ oz.	10.45 x 6.3 cm.	Fresh.
A.C.43.77	5/11/42	7½ oz.	9.8 x 6.5 cm.	Slightly incubated.
A.C.43.84	9/11/42	8½ oz.	10.3 x 6.7 cm.	" "
A.C.43.85	"	8¼ oz.	10.2 x 6.65 cm.	" "
A.C.43.86	"	7¾ oz.	10.0 x 6.45 cm.	" "
A.C.43.87	"	7½ oz.	10.7 x 6.55 cm.	" "
A.C.43.246	3/11/43	6 oz.	9.9 x 5.9 cm.	Fresh. From oviduct of A.C.43.240
Averages:		7.6 oz.	10.2 x 6.4 cm.	

The first fresh egg located on Campbell Island in 1942 was found on 31st October. On the 4th November of this year all three nests on Beeman Hill contained birds sitting close on an egg each.

On 1st November, 1943, an egg, obviously just ready to be extruded, was taken from the oviduct of the female of a mated pair taken as specimens. A fresh egg was found in a nest near Mount Azimuth on the 2nd November of this year, whilst the three nests on Beeman Hill each had a bird sitting closely on an egg on the 5th.

In 1945 three nests were again located on Beeman Hill, and each contained an incubating bird and egg on 6th November. (Fig. 4.)

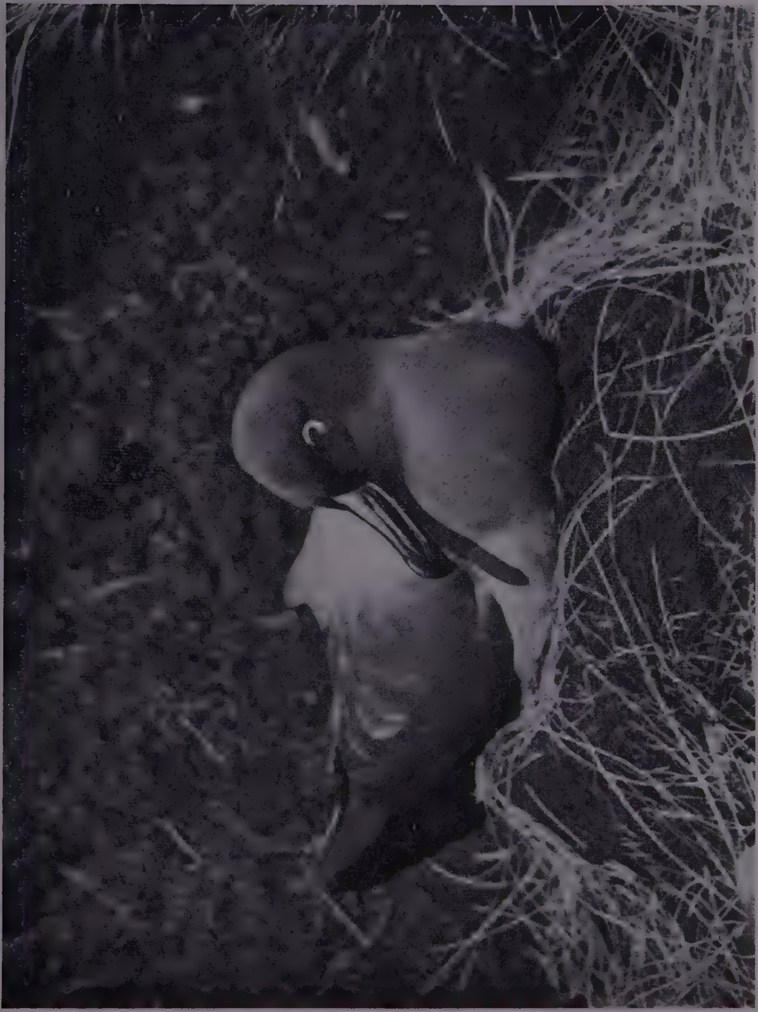

Fig. 4—Adult bird on nest and egg.

The actual laying date of the Beeman Hill birds studied was not exactly ascertained because of the desire not to frighten away ringed birds for reasons already given. It is evident that laying commences at the end of October and during the first week of November. The majority of eggs are laid during the first few days of the latter month. In 1947 two of the three incubating birds on Beeman Hill were males when the nests were visited on 12th November. This would represent the first change-over of incubation duties.

The dates given above agree closely with those recorded by Falla (3rd November, 1912, at Macquarie Island) and by Murphy (1st November, 1890, at South Georgia). Murphy, however, records having obtained a freshly laid egg as late as 1st December.

Both birds share the incubation period, but there is no definite time for each bird to sit. Obviously climatic conditions and the availability of food supplies will influence the change-over between mated pairs.

Falla (quoting Hamilton), Murphy and Oliver all record that whilst one bird is sitting the mate flies to and fro about the nest. Observations on the Campbell Island birds show that this is only true of the very early days of incubation. At later dates the departing bird, after the change-over, will circle a few times and may even land for a few brief caresses of the mate, but soon makes off for the open sea. As the birds studied were ringed, and the rings could be plainly seen on birds in flight at close range, it was found that circling birds about nesting colonies from the second week of incubation on are not ringed birds and therefore not the mates of sitting birds. These birds must be unmated stray birds attracted by the presence of sitting birds.

During incubation the sitting birds sit very closely and many strongly resist any attempt to dislodge them should one wish to examine the egg. Sharp rattling of the beak and gulping, retching noises are made. Some birds do actually vomit, usually a dark green oily liquid, if approached too closely. They also adopt a threatening attitude with flattened wings and out-thrust beak. Birds which have become used to human presence, on the other hand, take things very calmly and, unless suddenly startled, can be handled almost with impunity.

The Beeman Hill birds of the 1942–43 season were still sitting closely on 26th December and, the eggs having been laid on or about 1st November, the incubation period had reached fifty-six days. On 30th December of the same year (1942), a commotion at one nest led to an investigation to see if a chick had been hatched. The egg was still intact, however, and the commotion must have been between the mated pair at a change-over.

The first chick located on Beeman Hill in this season was found on 3rd January, 1943. From the size, appearance, and presence of membrane in the nest, the chick was judged to have been hatched on the 2nd. The second nest in this locality also had a chick present. This one was only just out of the egg and the down was still damp. The third nest contained an unchipped egg.

At another part of the island on 6th January of the same year, a number of nests were examined. All contained chicks, some of which were obviously just hatched. The third nest on Beeman Hill of this season did not produce a chick until the 11th January. The chick was quite dry and part of the shell adherent to the back was removed. It seemed very weak and succumbed a week or so later.

Observations support the view that most chicks are hatched between the 3rd and 6th of January each year. The incubation period is, therefore, approximately nine weeks (63–67 days).

BEHAVIOUR

Before giving the full details of the life of the Sooty Albatross chick from hatching to flight, some examples of strange behaviour noted among the Beeman Hill birds are given.

In 1947 the bird 22A which, although only handled once before when ringed a week earlier, was delightfully tame, only adopted a threatening attitude when approached on 18th November. By gently stroking the beak of this bird with a gloved finger it could be induced to simulate the actions of regurgitating food as if feeding a chick. When the beak was opened as if to pass food, a finger was inserted crosswise, but no food was passed. On this date also this sitting bird indulged in much "straw-passing" as if nest construction was in progress. Sometimes only the actions were gone through and no actual material handled at all. This "straw-passing" has already been commented on in a paper in the present series by the same author and among Royal Albatrosses. It seems to be an action more usually associated with courtship and has also been noted by the author among the mollymawks *Thalassarche melanophrys* and *T. chrysostoma.*

There seems to be a certain similarity of courtship procedure among the members of the family Diomedeidae, a basic underlying pattern as it were, which the various species follow.

Another piece of behaviour, more usually associated with courtship, is occasionally seen when one visits an incubating Sooty Albatross. The bird will sometimes give its piercing call and then, squarely facing the visitor, open the beak widely and repeatedly thrust it towards him. This is a typical piece of courtship procedure and the recipient wonders whether to be flattered or embarrassed!

A rather strange happening occurred when a chick was assisted from an egg. The journal entry is quoted in full: "At 5.30 p.m. on 11th January, 1943, the bird was covering a partly hatched chick and it seems likely that the latter has been partly out of the egg for some days. Certainly the chick was in difficulties and quite unable to get rid of about half the shell. It was quite dry and the membrane and shell was mixed with the down of the back. It seemed very weak, could not hold up its head or straighten out the wings or legs. I decided to take a hand and carefully removed the chick from the nest, the sitting parent raising no objections, but stepping off the nest and standing to one side. Whilst removing the adherent shell I heard the parent making retching noises and looked around, fully expecting that I was to be the target. This was not the case, however, for the peeping of the chick must have aroused parental instincts and the bird was merely regurgitating food on to the ground. First it ejected a small quantity of whitish oily liquid in a fine stream. This was closely followed by two more regurgitations of a slightly larger quantity of pinkish-brown liquid of a more 'soupy' consistency. I then placed the cleaned chick back in the nest, the parent immediately stepping on very carefully and covering it."

CHICKS—HATCHING TO FLIGHT

The following measurements and descriptions were taken each week, from hatching to departure, of Sooty Albatross chicks on Beeman Hill. As with the specimen birds listed earlier, weights are in avoirdupois and measurements in centimetres. "Beak" is the chord of the culmen; "tarsus" is taken from the anterior edge of the bulge on the posterior end of the tibio-tarsus to the middle point of the junction of toe and tarso-metatarsus (this is not usual practice and was discontinued at a later date); "toe" is from the junction of the toe and tarso-metatarsus to the end and includes the claw; "wing" is taken from the anterior edge of the wrist joint to the end of the wing and, after feathers appear, to the end of the longest primary. (Fig. 5.)

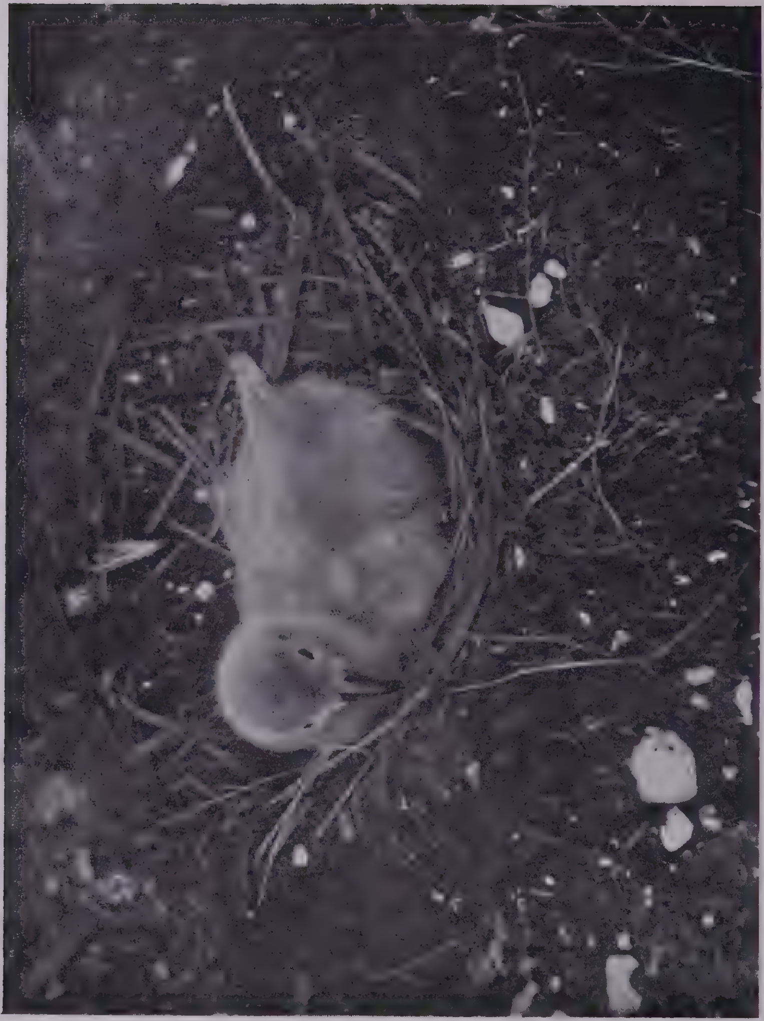

Fig. 5—Chick a few days old. Primary down.

Week 1 (9/1/43) (Fig. 6)

		Weight	Beak	Tarsus	Toe	Wing
7A.	Not yet hatched	—	—	—	—	—
8A.	Hatched 2/1/43	16 oz.	4.1	3.1	4.7	4.3
9A.	Hatched 3/1/43	15 oz.	3.9	3.0	4.1	3.8

8A. Almost bald on crown of head, the bluish-grey skin showing prominently against the fine down. Sides of head a lighter shade than rest of body which is powdery grey.

9A. Similar to above, but with sides of head a little lighter.

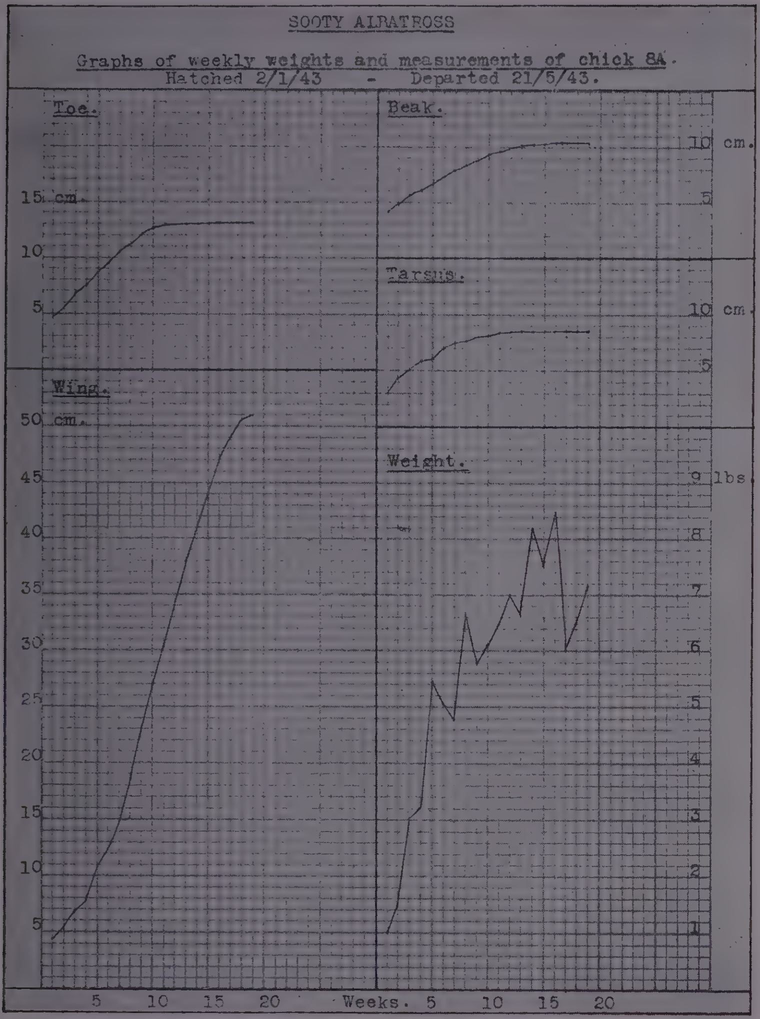

Fig. 6.

Week 2 (16/1/43)

7A.	Hatched 11/1/43	15 oz.	3.7	2.75	3.8	3.8
8A.		1 lb. 7½ oz.	4.9	4.3	5.6	5.3
9A.		1 lb. 4½ oz.	4.6	4.0	5.3	5.0

7A. Down longer and less matted than at hatching.

8A. Primary down shed over most of head and sides of neck. Below the eyes the primary down is still adherent. Parent standing over chick when sighted first, Chick clappered beak and made gulping noises.

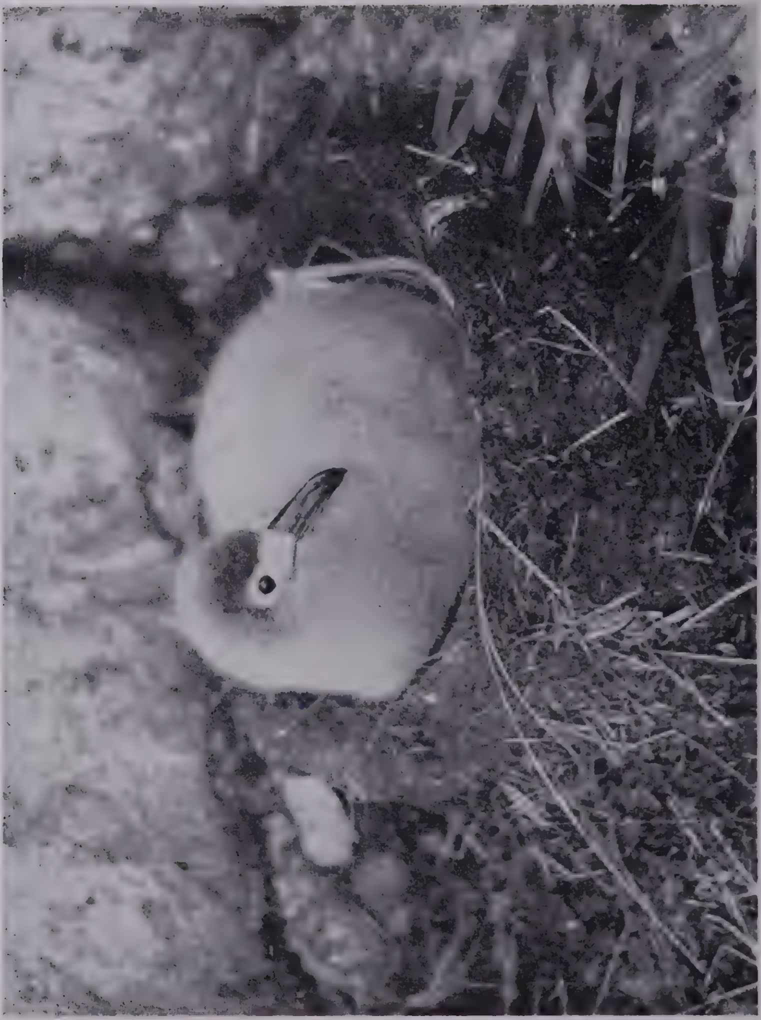

Fig. 7—Chick three weeks old. Secondary down appearing on head and lores.

9A. No adult in charge—evidently there is a very short guard period among Sooty Albatrosses. Primary down disappearing. Chick sat up, clappered beak and made gulping noises when approached.

Week 3 (23/1/43) (Figs. 7 and 8)

7A.	1 lb. 12 oz.	4.4	3.65	4.55	4.5
8A.	3 lb. 1 oz.	5.7	5.1	6.8	6.8
9A.	2 lb. 7 oz.	5.0	4.8	6.3	6.25

7A. Parent still in charge. Chick's head going bald with shedding of primary down. Body down elongating.

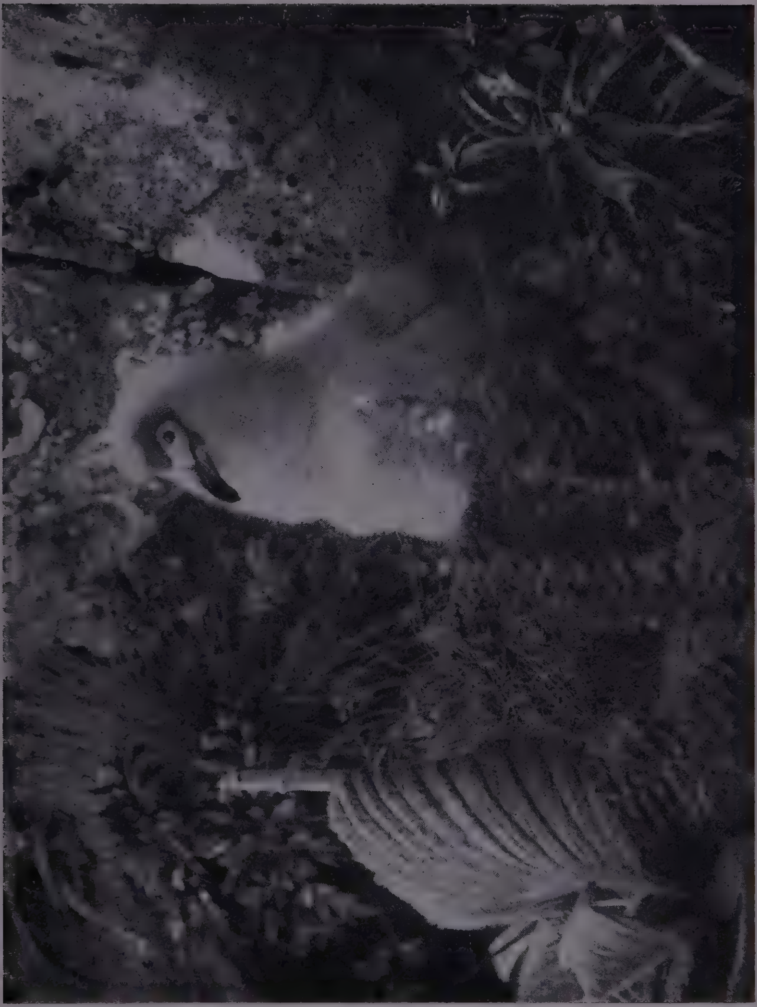

Fig. 8—Chick three weeks old.

8A. No adult in charge. This chick scaled 3 lb. 1 oz., but vomited whilst being weighed and went down to 2 lb. 12 oz. The food seemed to have been recently given and was of a lumpy nature. It was composed of fish flesh and squid remains. It also contained one penguin feather. Chick sat upright in nest before being handled and vomited a little brown oily liquid. All primary down off head and sides of neck, being replaced with very short dark velvety down.

9A. Behaved admirably and did not vomit. Head almost clear of primary down, but not quite as far advanced as 8A. The secondary down standing out at the back of the head makes this chick look like an Eskimo peering out of a fur parka. Very plump.

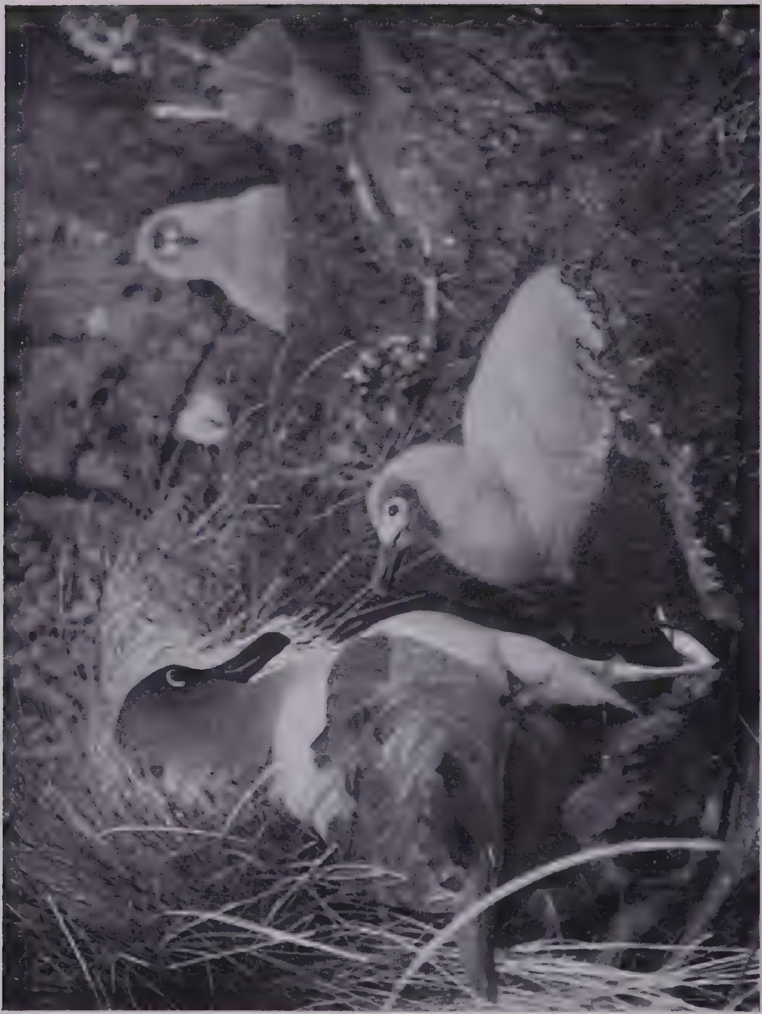

Fig. 9—Adult about to feed chick four weeks old.

Week 4 (30/1/43) (Fig. 9)

7A.	1 lb. 13½ oz.	4.7	4.1	5.2	5.1
8A.	3 lb. 4 oz.	6.1	5.8	7.5	7.8
9A.	4 lb. 3 oz.	5.5	5.3	6.7	7.2

7A. Adult still in charge. Secondary short dark down now right over head and upper part of neck.

8A. Little change in appearance except in size. Would have vomited when handled, but was prevented by a light rubber band slipped over the beak. Some fresh straw has been added to the nest. Now able to shuffle about and left the nest whilst being measured. Rim of nest broken down and chick leaves the nest to shelter from the sun.

9A. Little change noticeable except in size.

Week 5 (6/2/43)

7A.	1 lb. 14 oz.	5.3	4.7	6.3	7.1
8A.	5 lb. 7 oz.	6.7	6.1	8.7	11.0
9A.	3 lb. 5½ oz.	5.9	6.0	7.6	9.9

7A. Chick unguarded to-day. Eyes now browner and lost a greyish tint they had. Able to shuffle round and leave the nest.

8A. Behaved badly and vomited several times—oily material of a reddish-brown colour and containing fish flesh. Plumage much the same.

9A. Much the same as last week.

Week 6 (13/2/43)

7A. Dead.	—	—	—	—	—
8A.	5 lb. 2 oz.	7.3	7.05	9.55	12.3
9A.	6 lb. 14 oz.	6.8	6.8	9.1	11.5

7A. On 11/2/43 it was observed that this chick had a patch of fly maggots on a raw spot on the right wing—the result of an injury of some kind to the anterior end of the humeral flexure. It seemed healthy enough otherwise. Examination the next day showed the damage to be even more extensive with the humerus protruding and all raw flesh exposed covered with maggots. Some kerosene was applied, but the chick was found dead on the 13th. Post-mortem examination revealed abnormalities in addition to the area treated. The proximal end of the right tarso-metatarsus was damaged and had not properly joined with the tibio-tarsus. The distal end of the left humerus was bent almost at right angles. These weaknesses were evidently long-standing and aggravated by the tensing of the muscles with growth. They must have been present from an early stage of development and it is recalled that this chick could not free itself from the remaining half of the egg unassisted.

8A. Behaved reasonably well, but was obviously empty. Almost complete secondary down.

9A. Primary down on body elongating still more, but not yet all off the crown and back of head. Almost in complete secondary down. Fish bones and an eye lens alongside the nest.

Week 7(20/2/43)

8A.	4 lb. 12 oz.	7.9	7.3	10.6	14.8
9A.	4 lb. 8 oz.	7.2	7.3	9.8	14.0

8A. Still downy, with no feathers showing through. Short down below eyes very white now. Grey feathers are underneath the down on the back and the primaries are just appearing. Discarded feather sheaths about nest.

9A. Still a few tufts of primary down on the head. Feathers just appearing under down on back. No sign of primaries yet. Discarded feather sheaths about the nest.

Week 8 (27/2/43)

8A.	6 lb. 10 oz.	8.3	7.6	11.2	18.5
9A.	6 lb. 3 oz.	7.7	7.5	10.3	16.2

8A. Upper wing coverts and feathers on back showing through down. Both primary and secondary wing feathers showing. Down on head thinning out. Fresh tussock added to nest.

9A. No feathers through down yet. Primaries appearing under down on the wings. Down in front of eye very white. Many discarded feather sheaths.

Week 9 (6/3/43)

8A.	5 lb. 12 oz.	8.8	8.0	12.1	23.0
9A.	6 lb.	8.2	8.0	11.3	20.0

8A. A very large chick now. The secondary down on crown and body is greatly elongated now by being forced out by feathers beneath.

9A. Down elongating. Wing coverts and tips of primaries showing through.

Week 10 (13/3/43)

8A.	6 lb. 2 oz.	9.3	8.1	12.6	27.0
9A.	8 lb. 7 oz.	8.6	8.1	11.8	24.0

8A. Wing coverts well exposed as are feathers across back; primaries lengthening and now well exposed.

9A. Feathers just appearing through down on back; wing coverts well through; primaries exposed.

Week 11 (20/3/43)

8A.	6 lb. 8 oz.	9.6	8.3	12.9	30.5
9A.	8 lb.	9.0	8.3	12.4	29.0

8A. Down now greatly elongated on head and body; patch of white down below and to rear of eyes being replaced with fine dark feathers; wing coverts and back feathers exposing further. The characteristic light mantle is now appearing on the neck. Feathers on breast just appearing through the down.

9A. Dark feathers appearing under eyes and replacing down; secondary down greatly elongated and back feathers well through.

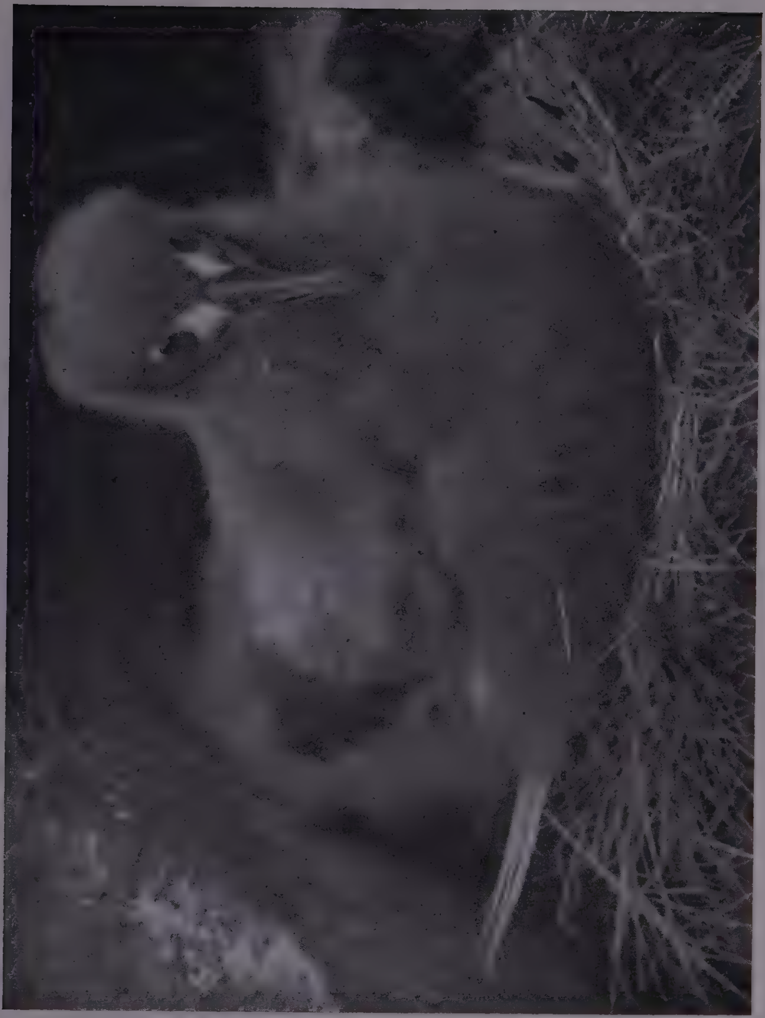

Fig. 10—Chick at twelve weeks.

Week 12 (27/3/43) (Fig. 10)

8A.	7 lb.	9.9	8.4	12.95	34.0
9A.	9 lb. 13 oz.	9.35	8.3	12.6	33.0

8A. Head feathers showing through down; dark feathers speedily replacing all white down on lores. A bare patch where orbital ring will appear showing minute white feathers.

9A. Dark feathers on lores increasing, but still much white down in front of eyes. Skin where orbital ring will appear now bare and lead-grey in colour.

Week 13 (3/4/43)

8A.	6 lb. 10 oz.	10.15	8.4	13.0	38.0
9A.	8 lb. 6 oz.	9.7	8.6	12.9	37.0

8A. Head clearing of secondary down. White orbital ring partly formed. About half lores covered with dark feathers, elsewhere with whitish down. An area at the base of the lower mandible still with whitish down. Back completely feathered.

9A. Minute white feathers appearing on orbital ring. Back almost fully feathered; head still downy. Half lores with dark feathers.

Week 14 (10/4/43)

8A.	8 lb. 3 oz.	10.2	8.5	13.0	41.0
9A.	7 lb. 14 oz.	9.9	8.6	13.0	40.5

8A. Head almost free of down with only a few tufts at base of culmen. A few dark feathers appearing in white orbital ring. Dark feathers invading down at base of lower mandible. Tail showing well. Down over wings disappearing.

9A. Back free of down; head clearing, but still a ring of down about neck. Orbital ring well developed, but with a few dark feathers interspersed. White down at base of lower mandible being replaced by dark feathers. Tail showing well and wings clearing of down.

Week 15 (17/4/43)

8A.	7 lb. 8 oz.	10.25	8.5	13.0	44.0
9A.	8 lb. 8 oz.	10.1	8.6	13.0	43.5

8A. A small tuft of down at base of culmen; front of neck, chest and belly still covered with down, but divided by a band of feathers. Wings clear. All down disappearing rapidly and ground about nest covered. Orbital ring now mottled with small greyish-brown feathers among the white ones. All down off lores. A little spilt food by the nest, purplish in colour and appeared to be squid.

9A. A tuft of down above base of beak and a ring around the neck, but latter clearing. Fore-neck and chest still covered with down; a band of feathers separates chest and belly. Orbital ring mottled with minute brown feathers. White down on lores all gone.

Week 16 (24/4/43) (Figs. 11 and 12)

8A.	8 lb. 8 oz.	10.3	8.5	13.1	47.0
9A.	7 lb. 8 oz.	10.2	8.6	13.0	47.0

8A. Still a small tuft of down on forehead and a ruff of down on sides and front of neck. A little down on rump and belly. The orbital ring is now more brown than white, the dark feathers having increased, particularly on the lower part. The eye colour seems to have changed a little and is now a golden brown. Some spilt food near nest, coloured purplish and white, and seemingly composed of fish and squid.

9A. Head and neck as 8A, but sparser at back. A little down on the rump and a patch on belly. Orbital ring now more than half composed of dark feathers, particularly the lower half. Eyes a lighter brown than formerly. Collected a large

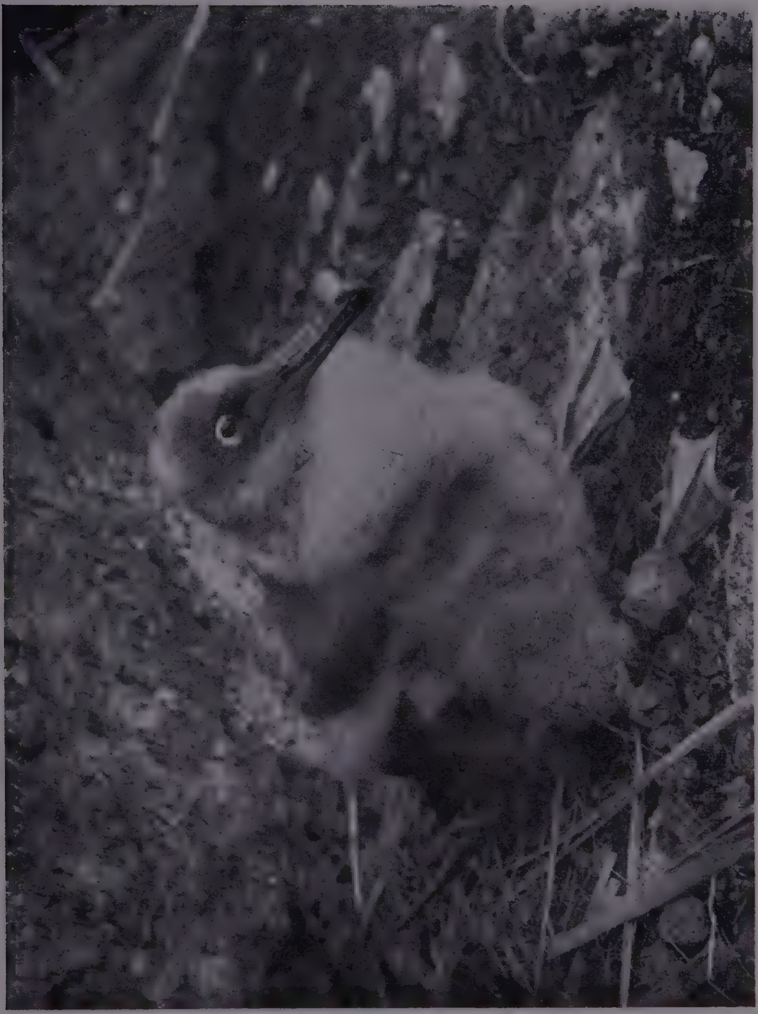

Fig. 11—Chick at sixteen weeks.

casting composed of squid beaks and penguin feathers. The presence of penguin feathers is interesting; they have also been noted in the stomach of a mollymawk (*Thalassarche chrysostoma*). Presumably they are picked up at sea by the adults and passed to the chicks with food.

Week 17 (1/5/43)

8A.	6 lb.	10.35	8.6	13.1	49.0
9A.	7 lb. 3 oz.	10.3	8.6	13.1	49.5

8A. Still a small tuft of down on forehead. A little down on fore-neck, rump and thighs, but has all gone from other parts. Orbital ring much as last week—a little darker if anything. Squid beaks about nest.

9A. A small tuft of down still on forehead. Some down still on fore-neck, but has gone from the back. A little down on thighs, rump and lower part of belly. Orbital ring now very dark with but few white feathers remaining. Squid beaks about nest.

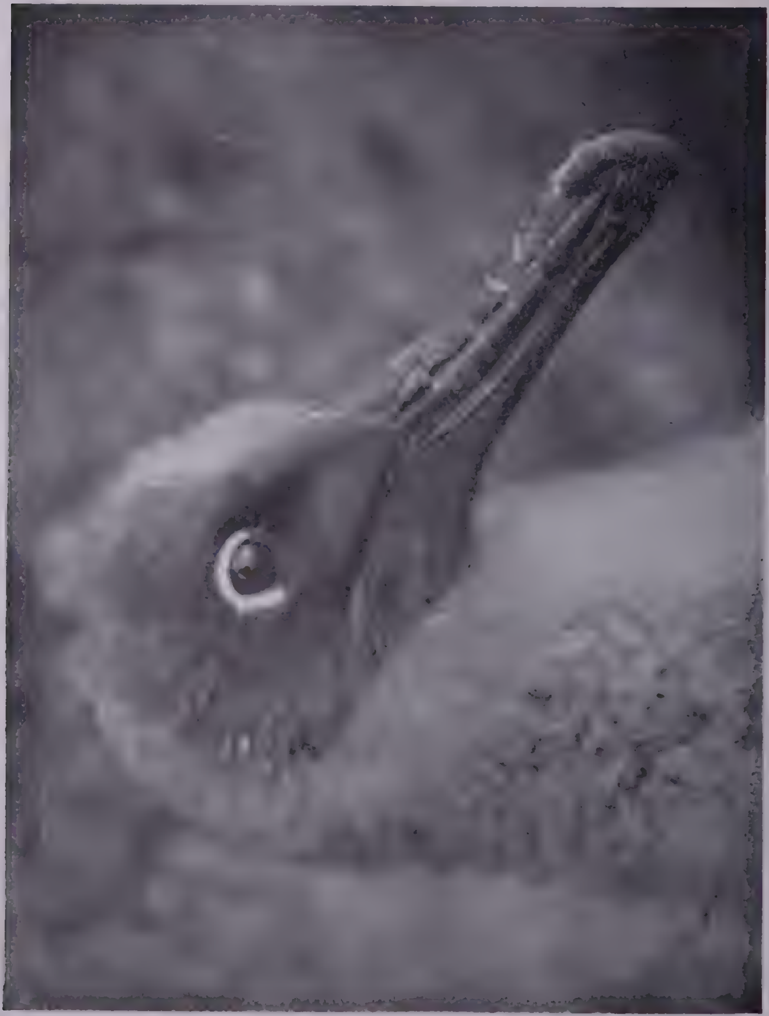

Fig. 12—Head of chick at sixteen weeks. Orbital ring commencing to darken.

Week 18 (8/5/43)

8A.	6 lb. 7 oz.	10.35	8.6	13.1	50.5
9A.	7 lb. 11 oz.	10.3	8.6	13.1	51.0

8A. All down off body except tuft on forehead. Orbital ring very dark. Beaks of squid plentiful about the nest (black horny beaks attached to a dark green membranous matrix).

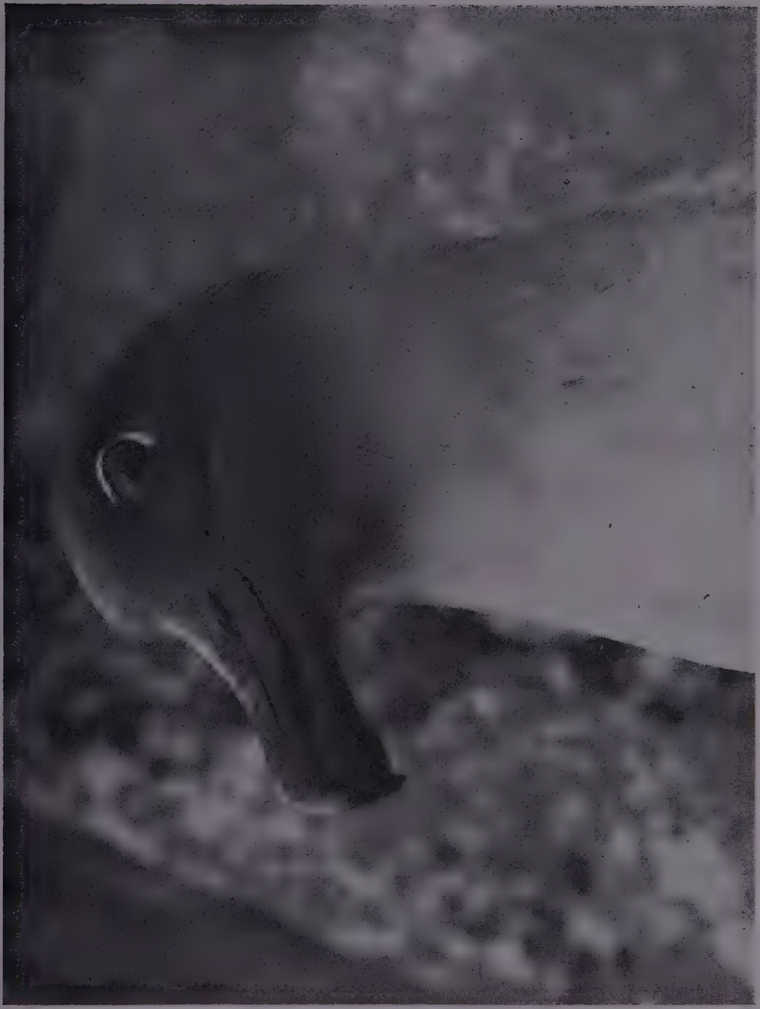

Fig. 13—Fledgling at twenty weeks and ready to fly. Orbital ring now dark. All photographs by the author.

9A. A very little down on thighs and lower part of belly; elsewhere clear except for tuft on forehead. Feathers on fore-neck where down has recently disappeared very ruffled. Orbital ring very mottled.

Week 19 (15/5/43)

8A.	7 lb. 3 oz.	10.35	8.6	13.1	51.0
9A.	7 lb. 13 oz.	10.3	8.6	13.1	51.5

8A. Complete juvenal plumage except for a tiny tuft of down which persists on the forehead. Orbital ring very mottled, with more brown than white feathers. Mandibular sulcus showing brownish.

9A. Very much the same as 8A.

Week 20 (22/5/43) (Fig. 13)

Both 8A and 9A have departed from their respective nests. Judging by marks about the nests, 8A left yesterday and 9A to-day. The nest of the latter was still dry when visited, despite rain.

CAMPBELL ISLAND RINGED BIRDS

Season	1942/43	1943/44	1944/45	1945/46	1946/47	1947/48
Mated Pairs	1A & 2A 3A & 4A 5A & 6A	10A & ? 11A & 12A 14A & 15A 13A	1A & ? 10A & ?	1A & 2A 3A & 4A 11A & 12A	3A & ? 19A & ? 20A & ?	1A & 2A 6A & 24A 22A & 23A
Fledglings (Beeman)	8A 9A		16A			
Elsewhere			17A 18A 19A			

From the above table it will be seen that some at least of the ringed birds have nested again in the following season.

A query means that the mate of the ringed bird was not seen. Because of the relief of resident parties on the island usually taking place in January of each year, it was not always possible to find the parent birds at the nest. It is unlikely, however, that the bird 1A had a different mate in the 1944–45 season and, therefore, the pair (1A and 2A) have nested four times in six years.

The bird 6A was not seen from the 1942–43 season, when it was first ringed, until the 1947–48 season. It now has a new mate, but its old mate (5A) has never been seen since it was originally ringed.

The bird 13A was a stray bird captured and ringed near a mated pair with a nest.

ACKNOWLEDGMENT

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